## Claims

1. A catalytic filter for removal of soot particulates from diesel engine exhaust, comprising:

an oxidation catalyst positioned upstream of the catalytic filter, prepared by treating a PGM (platinum group metal) salt and a transition/alkali metal salt with a water-soluble polymer compound and a reducing agent, to obtain a first colloidal mixture solution, which is then washcoated to a catalyst-support-coated monolithic ceramic substrate; and

a catalyzed wall-flow filter positioned downstream of the catalytic filter, prepared by treating a PGM (platinum group metal) salt and a metal salt mixture including at least one selected from a first group of catalyst metal to enhance oxidation activity and at least one selected from a second group of catalyst metal to decrease a combustion temperature of soot particulates, with a water-soluble polymer compound and a reducing agent, to obtain a second colloidal mixture solution, which is then washcoated on a catalyst-support-coated wall-flow filter.

2. The catalytic filter according to claim 1, wherein the metal salt mixture used for the catalyzed wall-flow filter further comprises at least one selected from a third group of catalyst metal to prevent oxidation of sulfur dioxide.

3. The catalytic filter according to claim 1 or 2, wherein

the catalyst support comprises active alumina, silica, and/or titania.

4. The catalytic filter according to claim 1 or 2, wherein the catalyst support contains 0.1-1.5 $g/in^3$ of $TiO_2$ and 0.1-1.5 $g/in^3$ of $SiO_2$, with a weight ratio of $TiO_2$ to $SiO_2$ of 2-4:1.

5. The catalytic filter according to claim 1 or 2, wherein the platinum group metal salt comprises Pt, Pd, Ru, Ir, Rh, or combinations thereof.

6. The catalytic filter according to claim 1 or 2, wherein the transition/alkali metal salt comprises Ba, Ce, Co, Cr, Cs, Cu, Fe, K, Mg, Mn, Mo, Ni, Pb, V, W, or combinations thereof, and a weight ratio of the platinum group metal to the transition/alkali metal is in a range of 1:0.1-5.

7. The catalytic filter according to claim 1 or 2, wherein the oxidation catalyst contains 5-45 $g/ft^3$ of platinum group metal.

8. The catalytic filter according to claim 1, wherein the first group of catalyst metal is selected from Ba, Cr, Mn, Fe, Co, Ni, Cu, Mo, V and Pb, and the second group of catalyst metal is selected from Li, Na, K, Mg, Ca and Cs.

9. The catalytic filter according to claim 1 or 8, wherein

the catalyzed wall-flow filter contains 5-45 g/ft$^3$ of the platinum group metal, 10-120 g/ft$^3$ of the first group of catalyst metal, and 5-40 g/ft$^3$ of the second group of catalyst metal.

10. The catalytic filter according to claim 2, wherein the first group of catalyst metal is selected from Ba, Cr, Mn, Fe, Co, Ni, Cu, Mo, V and Pb, and the second group of catalyst metal is selected from Li, Na, K, Mg, Ca and Cs, and the third group of catalyst metal is selected from V, W and Mo.

11. The catalytic filter according to claim 2 or 10, wherein the catalyzed filter contains 5-45 g/ft$^3$ of the platinum group metal, 10-120 g/ft$^3$ of the first group of catalyst metal, 5-40 g/ft$^3$ of the second group of catalyst metal, and 10-150 g/ft$^3$ of the third group of catalyst metal.

12. The catalytic filter according to claim 1 or 2, wherein the catalyst-support-coated monolithic ceramic substrate comprises flow-through ceramic honeycomb monolith, and the catalyst-support-coated wall-flow filter comprises wall-flow ceramic honeycomb filter, ceramic foam, ceramic fiber filter, metal honeycomb, metal foam, or metal mesh.

13. A method of preparing a catalytic filter for removal of soot particulates from diesel engine exhaust, comprising:

treating a PGM (platinum group metal) salt and a

transition/alkali metal salt with a water-soluble polymer compound and a reducing agent, to obtain a first colloidal mixture solution, which is then washcoated to a catalyst-support-coated monolithic ceramic substrate, followed by calcination process at high temperatures, to obtain an oxidation catalyst; and

treating a PGM (platinum group metal) salt and a metal salt mixture including at least one selected from a first group of catalyst metal to increase oxidation activity for nitrogen oxide and at least one selected from a second group of catalyst metal to decrease a combustion temperature of soot particulates, with a water-soluble polymer compound and a reducing agent, to obtain a second colloidal solution, which is then washcoated on a catalyst-support-coated wall-flow filter, followed by calcination process at high temperatures, to obtain a catalyzed wall-flow filter.

14. The method according to claim 13, wherein the metal salt mixture used for the catalyzed wall-flow filter further comprises at least one selected from a third group of catalyst metal to prevent oxidation of sulfur dioxide.

15. The method according to claim 13 or 14, wherein the water-soluble polymer compound comprises polyvinylalcohol, polyvinylpyrrolidone, or polymethylacrylate.

16. The method according to claim 13 or 14, wherein the

reducing agent comprises methanol, ethanol, hydrazine, or a mixture of methanol/sodium hydroxide.

17. The method according to claim 13 or 14, wherein the catalyst-support comprises active alumina, silica and/or titania.

18. The method according to claim 13 or 14, wherein the platinum group metal salt comprises Pt, Pd, Ru, Ir, Rh, or combinations thereof.

19. The method according to claim 13 or 14, wherein the transition/alkali metal salt comprises Ba, Ce, Co, Cr, Cs, Cu, Fe, K, Mg, Mn, Mo, Ni, Pb, V, W, or combinations thereof, and a weight ratio of the PGM to the transition/alkali metal is in a range of 1:0.1-5.

20. The method according to claim 13, wherein the first group of catalyst metal is selected from Ba, Cr, Mn, Fe, Co, Ni, Cu, Mo, V and Pb, and the second group of catalyst metal is selected from Li, Na, K, Mg, Ca and Cs.

21. The method according to claim 14, wherein the first group of catalyst metal is selected from among Ba, Cr, Mn, Fe, Co, Ni, Cu, Mo, V and Pb, and the second group of catalyst metal is selected from among Li, Na, K, Mg, Ca and Cs, and the third group of catalyst metal is selected from among V, W and Mo.